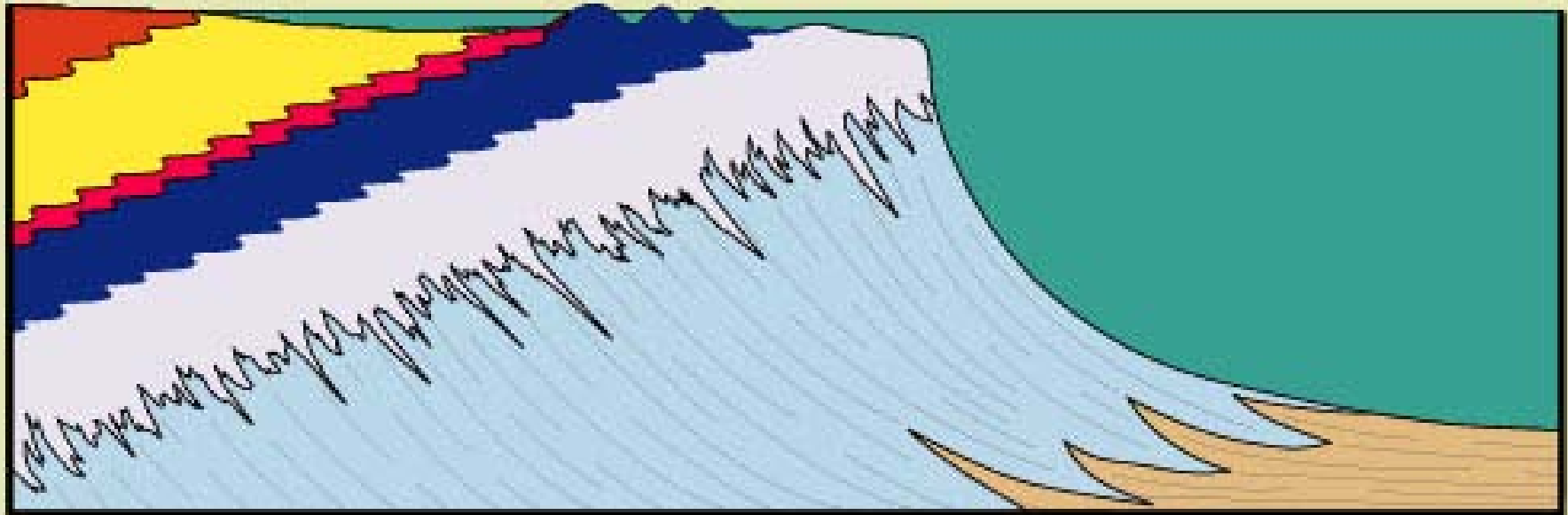


Standard Guadalupian Facies Spectrum



Redbeds & sabkha
or salina evaporites

Pisolitic &
grainstones

Reef

Basin

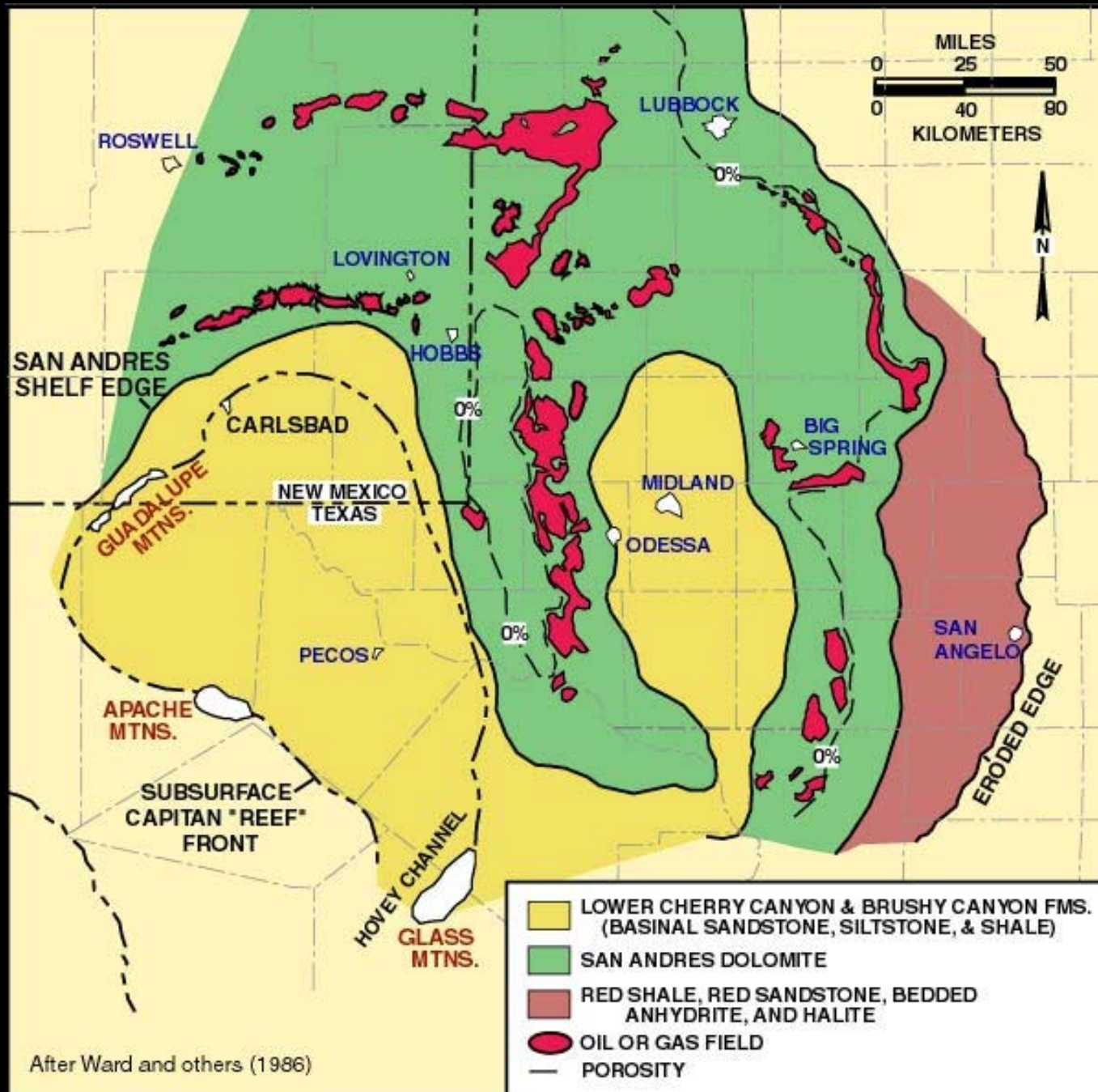
Lagoonal
mudstones

Back-reef
grainstones

Forereef

Ca. 1 km

Image from P. Scholle at New Mexico School of Technology:
<http://geoinfo.nmt.edu/staff/scholle/guadalupe.html>



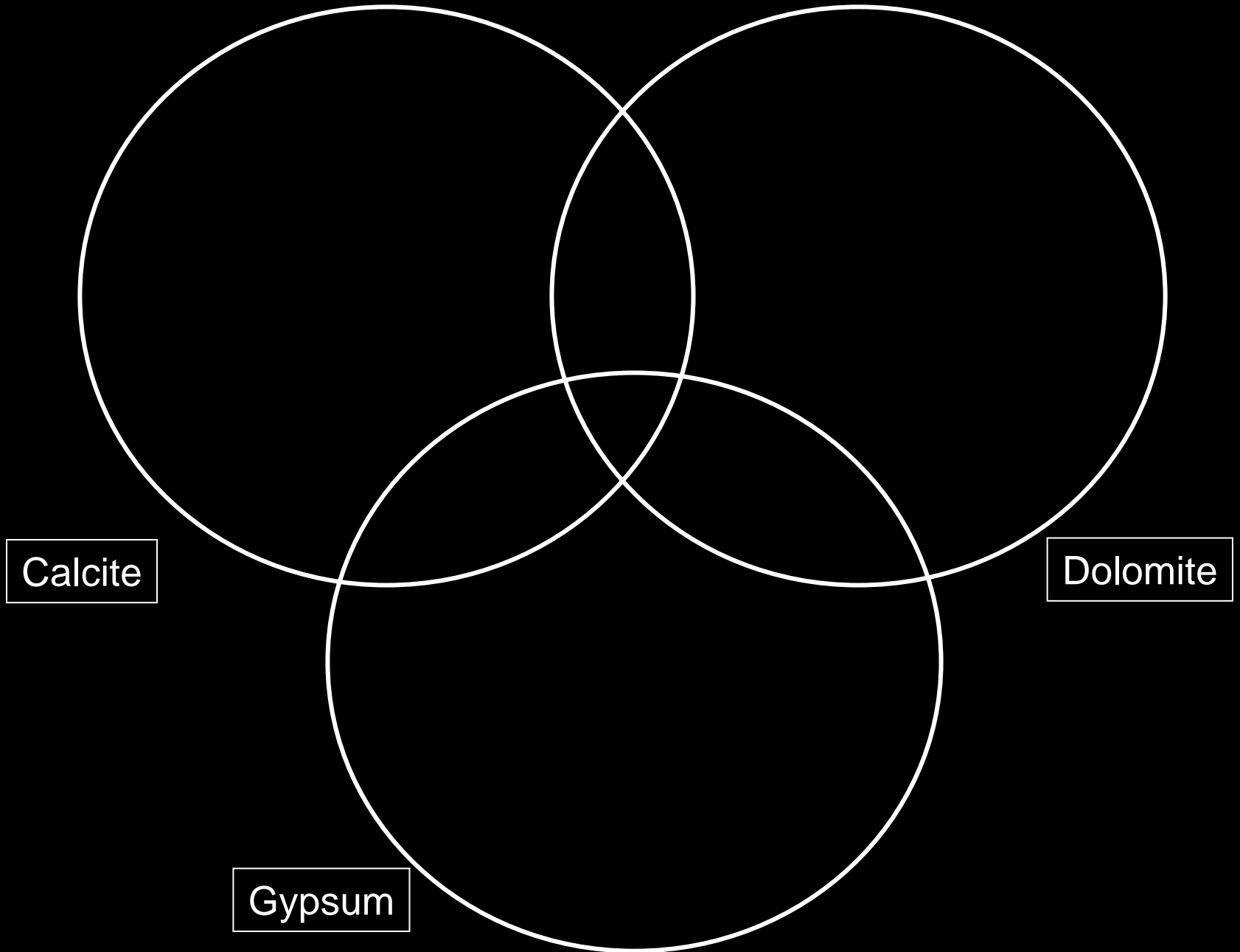
Mineral Identification Chart

Initial Characteristics

Mineral Names and other Features

Metallic	Nonmagnetic	Gold/bronze colored	Pyrite (Fool's Gold, FeS_2)- black striations	
			Splits into paper-like sheets	Gypsum (Used in drywall, $\text{CaSO}_4 \cdot 2\text{H}_2\text{O}$) -usually clear
				Muscovite Mica ($\text{KAl}_2(\text{AlSi}_3\text{O}_{10})(\text{F}, \text{OH})_2$) - transparent sheets
				Calcite (CaCO_3 ; found in limestone and shells) -rhombohedral crystals
Nonmetallic	Softer than fingernail	Good cleavage	Splits into paper-like sheets	Reacts with HCl
				Powder reacts with HCl
				Salty taste
			Dolomite ($\text{CaMg}(\text{CO}_3)_2$) -may occur as rhombus shapes	
Nonmetallic	Softer than glass; harder than fingernail	Good cleavage	Halite (NaCl ; common table Salt)- transparent or translucent	
			Powder reacts with HCl	Orthoclase (AlSiO_2 ; potassium Feldspar)- usually pinkish
				Quartz (SiO_2)- may be clear, Pink, smoky, or purple
Nonmetallic	Harder than glass	No cleavage		

Venn Diagram for Minerals



These processes break down the igneous rock into small pieces called sediment.

These processes change pre-existing igneous or sedimentary rock into a new rock.

Sedimentary Rocks

Weathering
Erosion

High Temperature
and Pressure

Melting

Igneous Rocks

Metamorphic Rocks

THE ROCK CYCLE

Cooling

Melting

Magma

As the magma cools, crystals form and eventually the magma solidifies.

A continued increase in temperature leads to the melting of the rock.

Rock Identification Chart

Igneous Rocks
(interlocking crystals)

Mafic

Basalt- crystals invisible to naked eye, may be vesicular

Felsic

Granite- visible crystals, contains quartz, feldspar, and other minerals

Sedimentary Rocks
(grains cemented together,
Or precipitated from solution)

Chemical

Trona- re-deposited CaCO_3

Limestone- crystalline, deposited CaCO_3 , may contain fossils or ooids

Conglomerate- cemented pebbles or gravel

Clastic

Sandstone- cemented sand grains

Shale- cemented clay grains

Bioclastic

Coquina- cemented shell fragments

Coal- compressed organic material

Metamorphic Rocks
(igneous or sedimentary rocks
subjected to heat and/or
pressure)

Foliated

Gneiss- metamorphosed granite or schist

Schist- metamorphosed slate

Crystalline

Marble- metamorphosed limestone

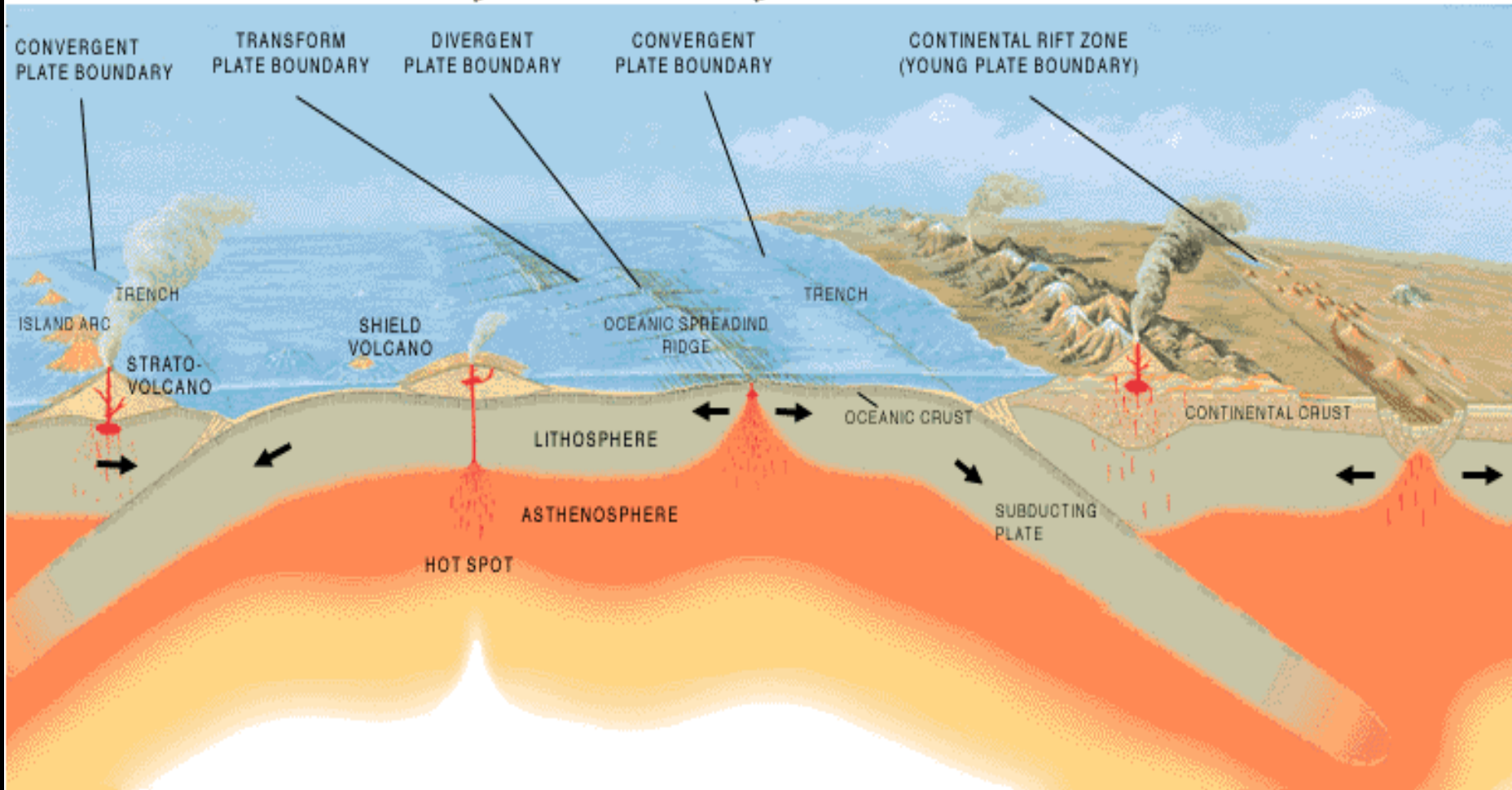
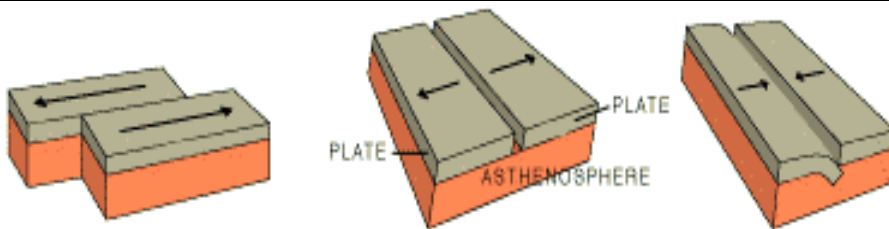


Diagram from USGS Education and Outreach web page
<http://geology.er.usgs.gov/eastern/tectonic.html>

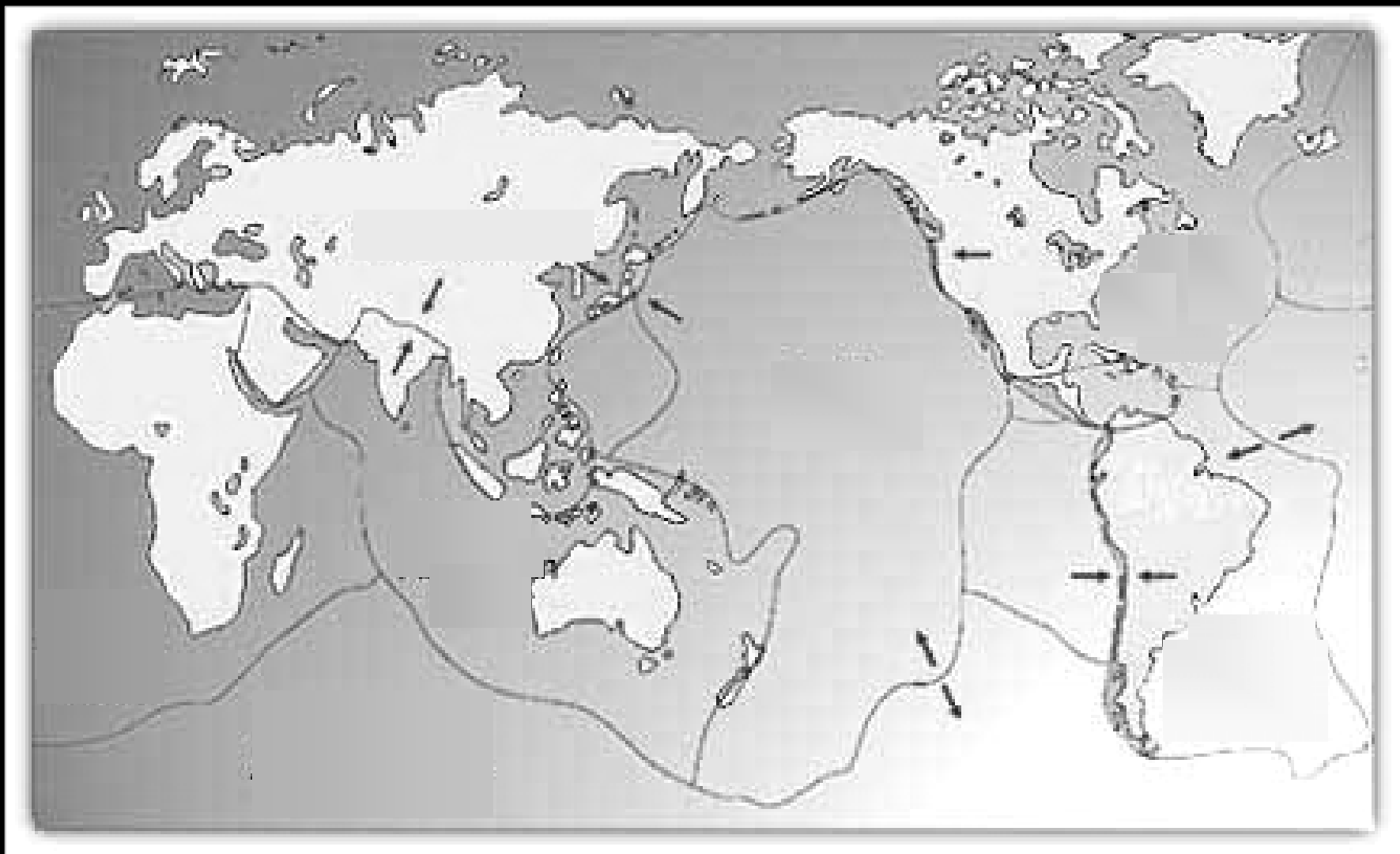


Diagram modified from Think Quest's Plate Tectonics web page
<http://library.thinkquest.org/17457/platetectonics/index.php>

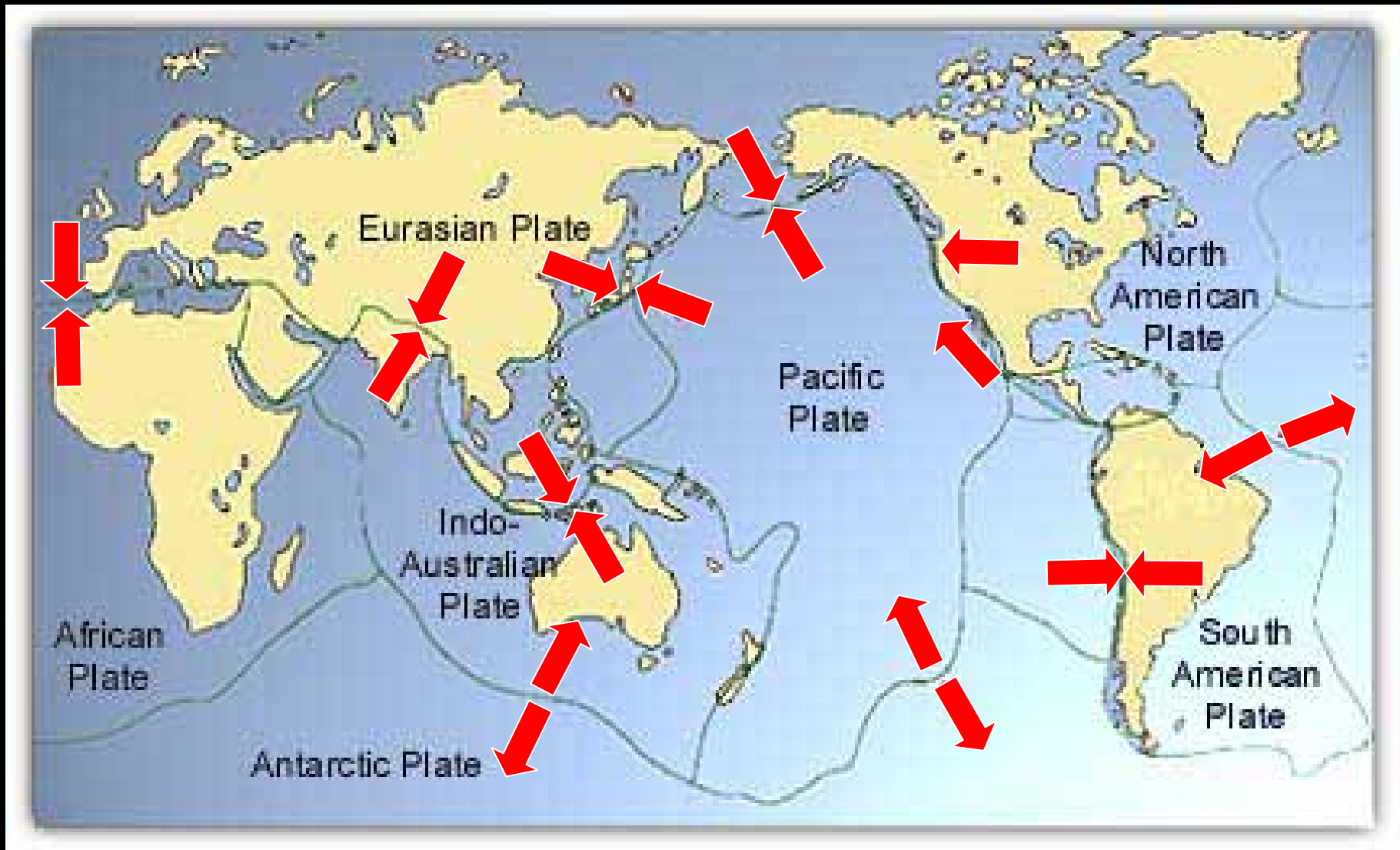
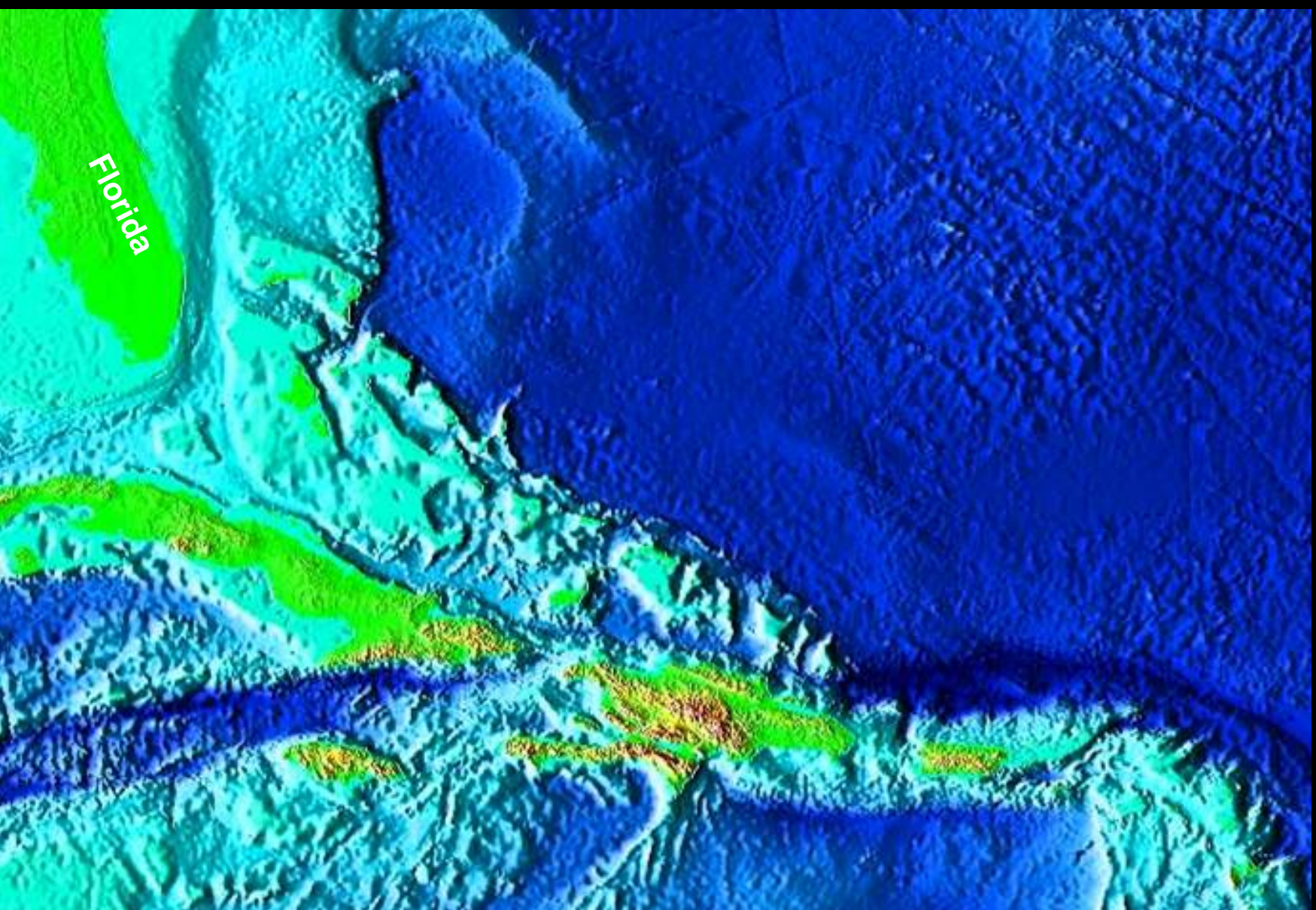


Diagram from Think Quest's Plate Tectonics web page
<http://library.thinkquest.org/17457/platetectonics/index.php>

Bathymetry from NOAA's imagery website:
<http://www.ngdc.noaa.gov/mgg/image/2minsurface/45N090W.html>



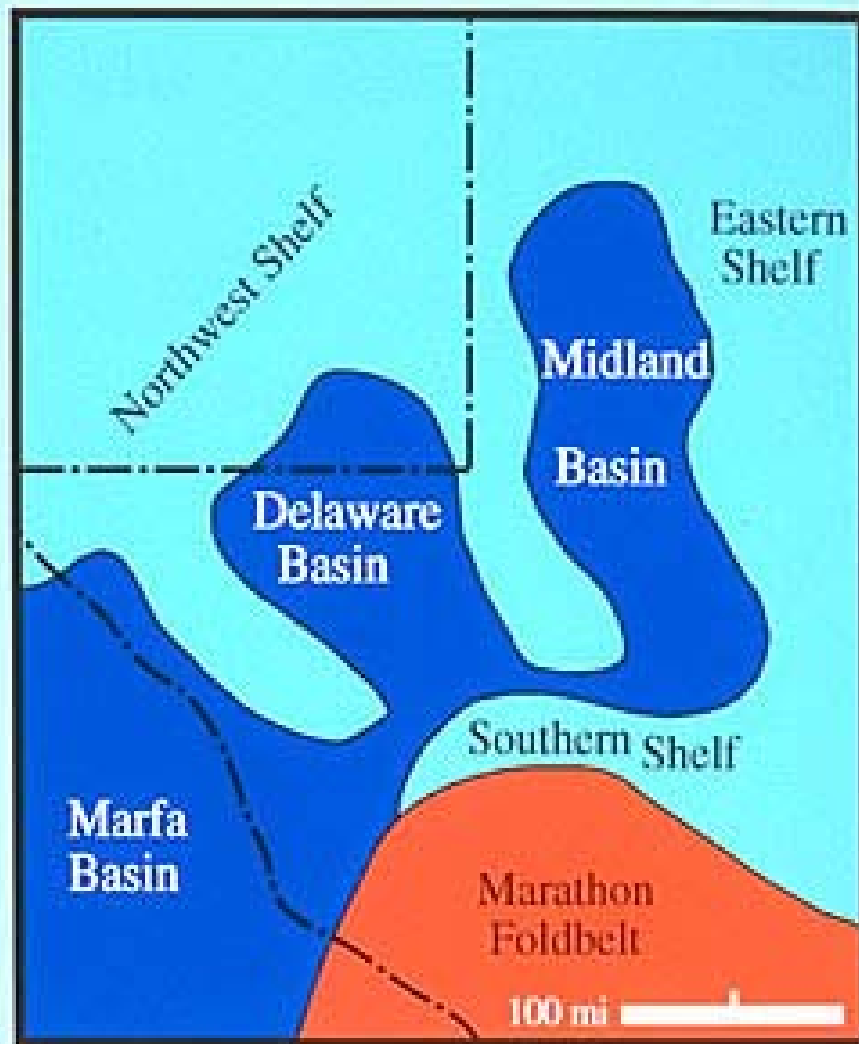
Highest land elevation



Deepest ocean depths



Bahama Banks



Permian Basin

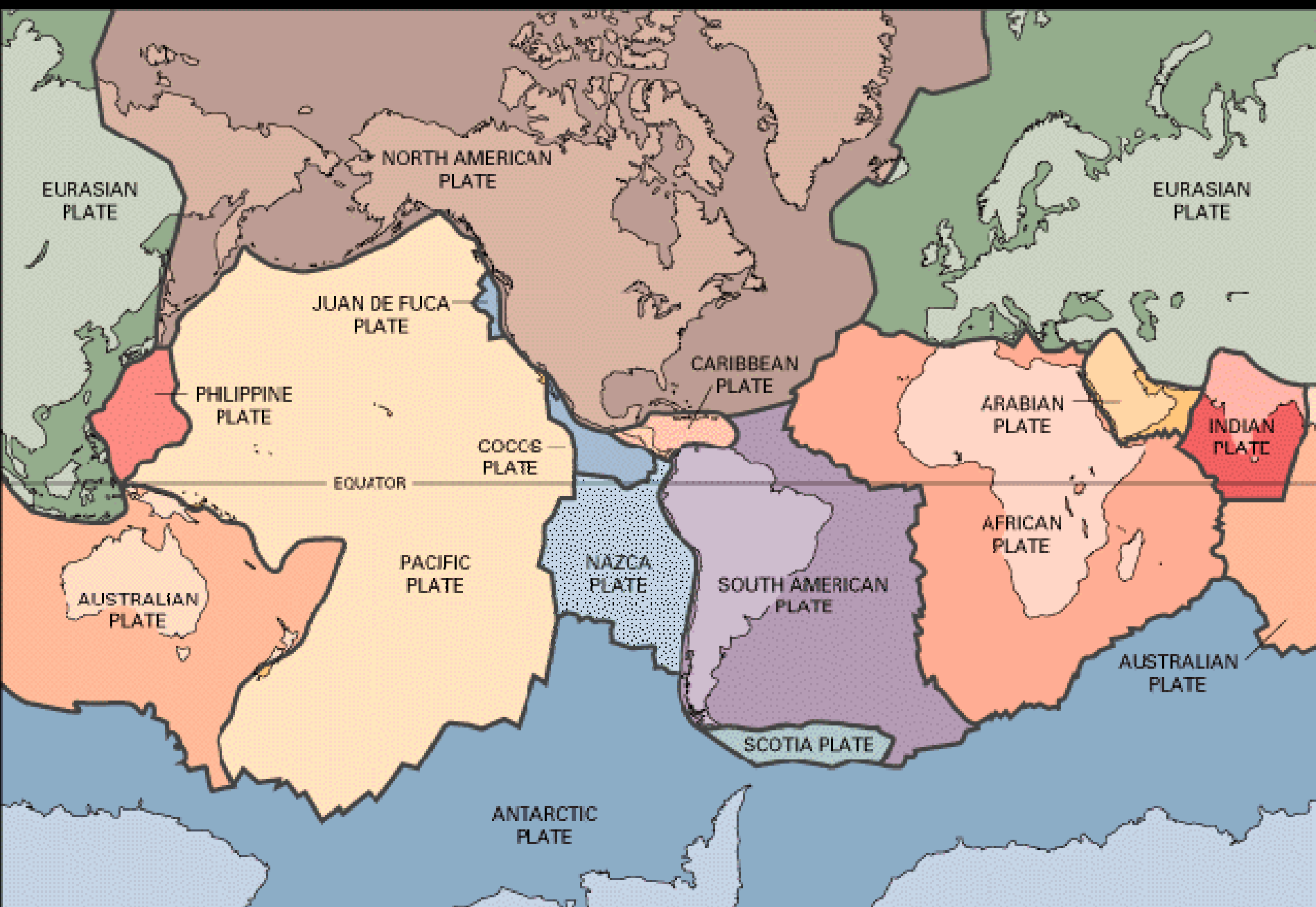


Diagram from USGS Education and Outreach web page
<http://geology.er.usgs.gov/eastern/plates.html>

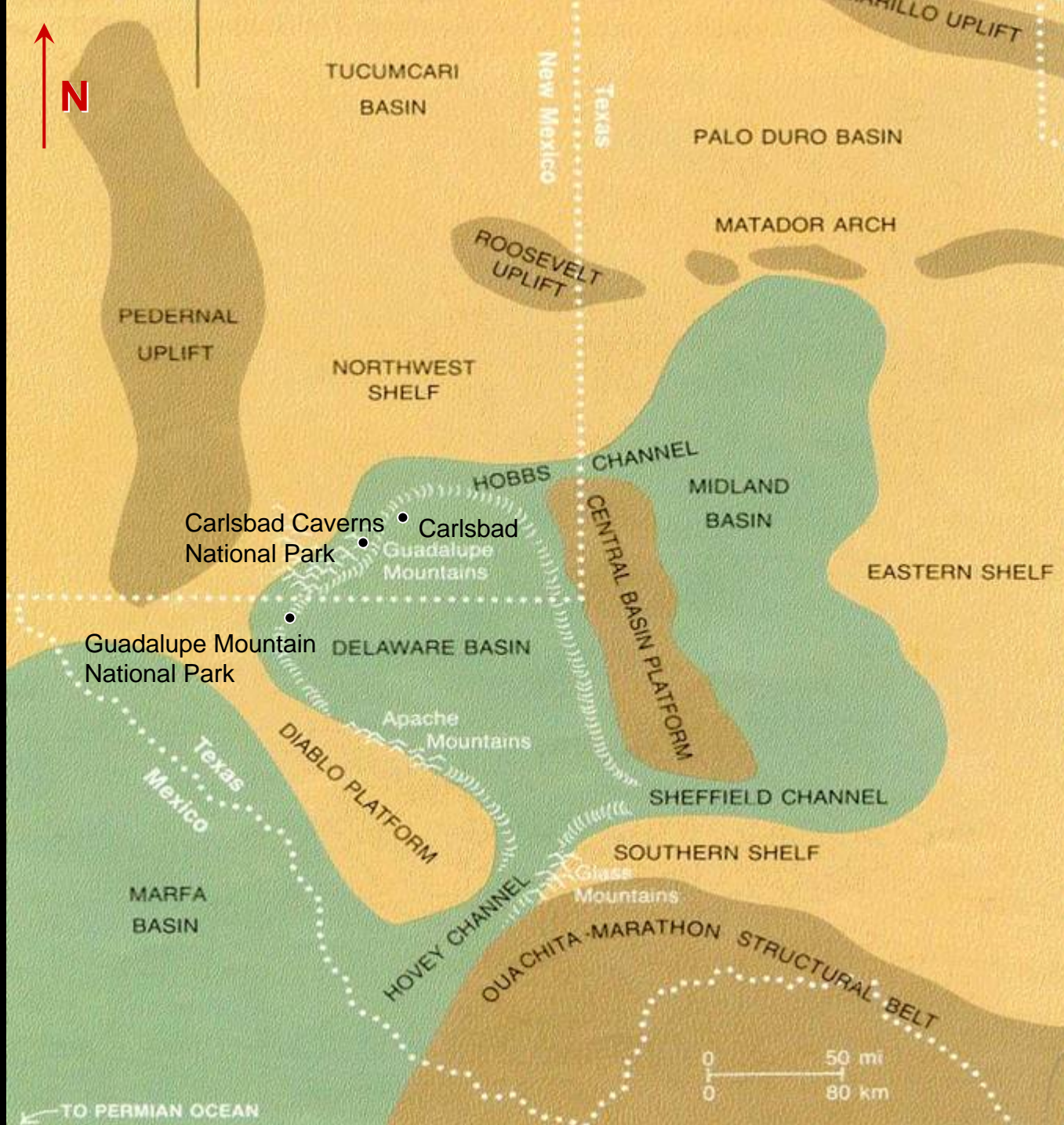




Photo from Northern Michigan Permian website
<http://seaborg.nmu.edu/earth/Permian.html>



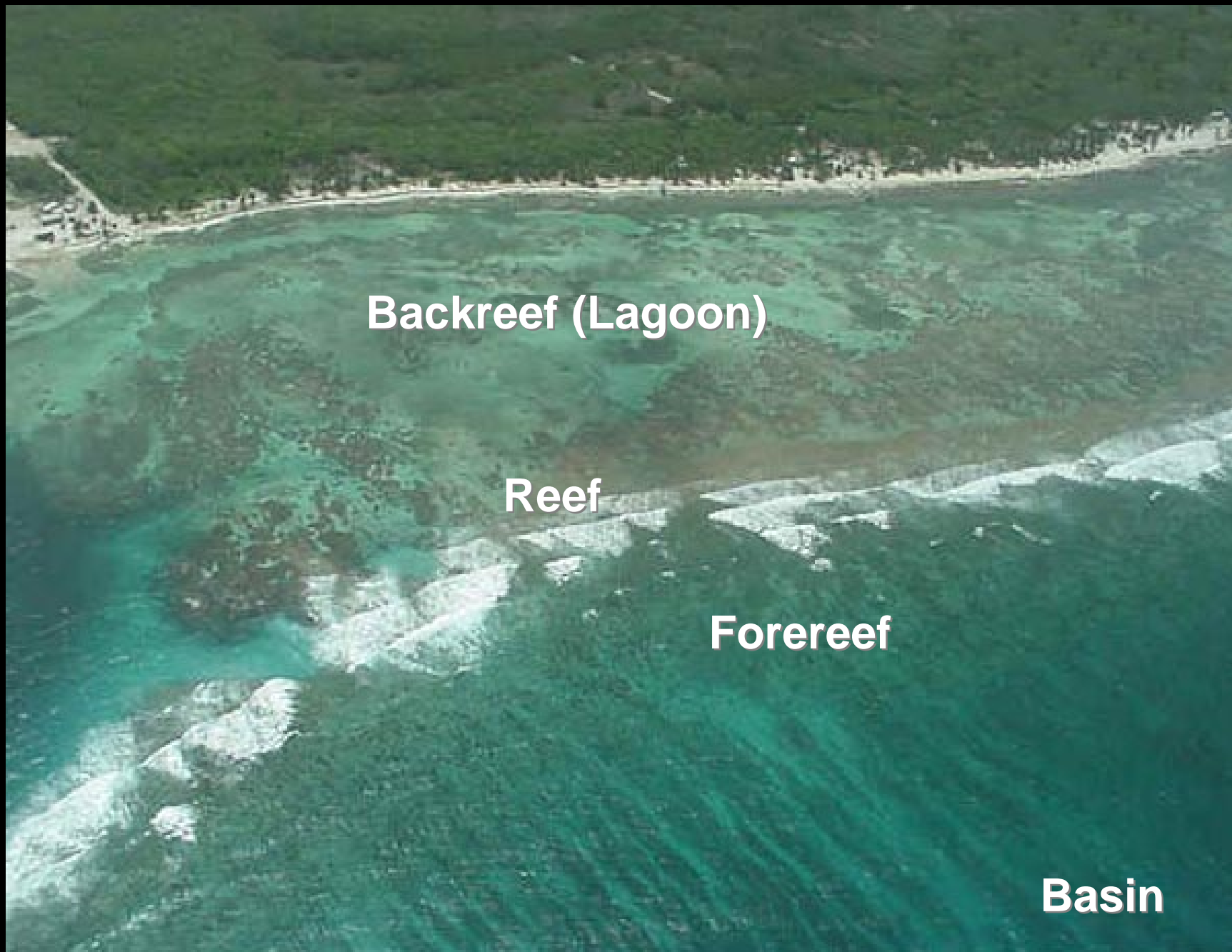
Photos from NOAA's Coral Reef Online
website <http://www.coralreef.noaa.gov/>

KINGDOM OF CORAL

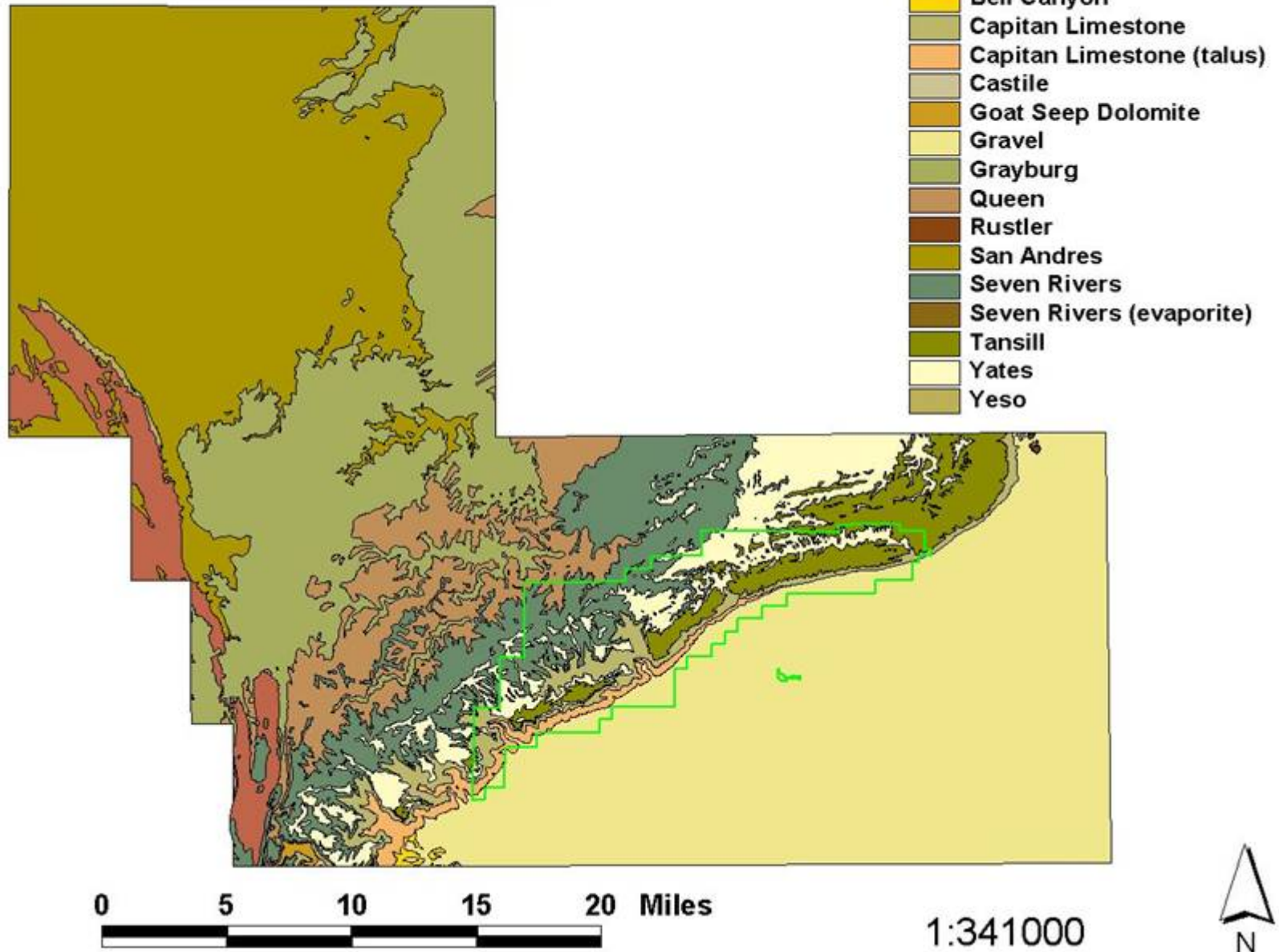
Australia's Great Barrier Reef



Photo by David Doubilet on National Geographic Magazine's Online website
<http://www.nationalgeographic.com/ngm/0101/feature2/index.html>

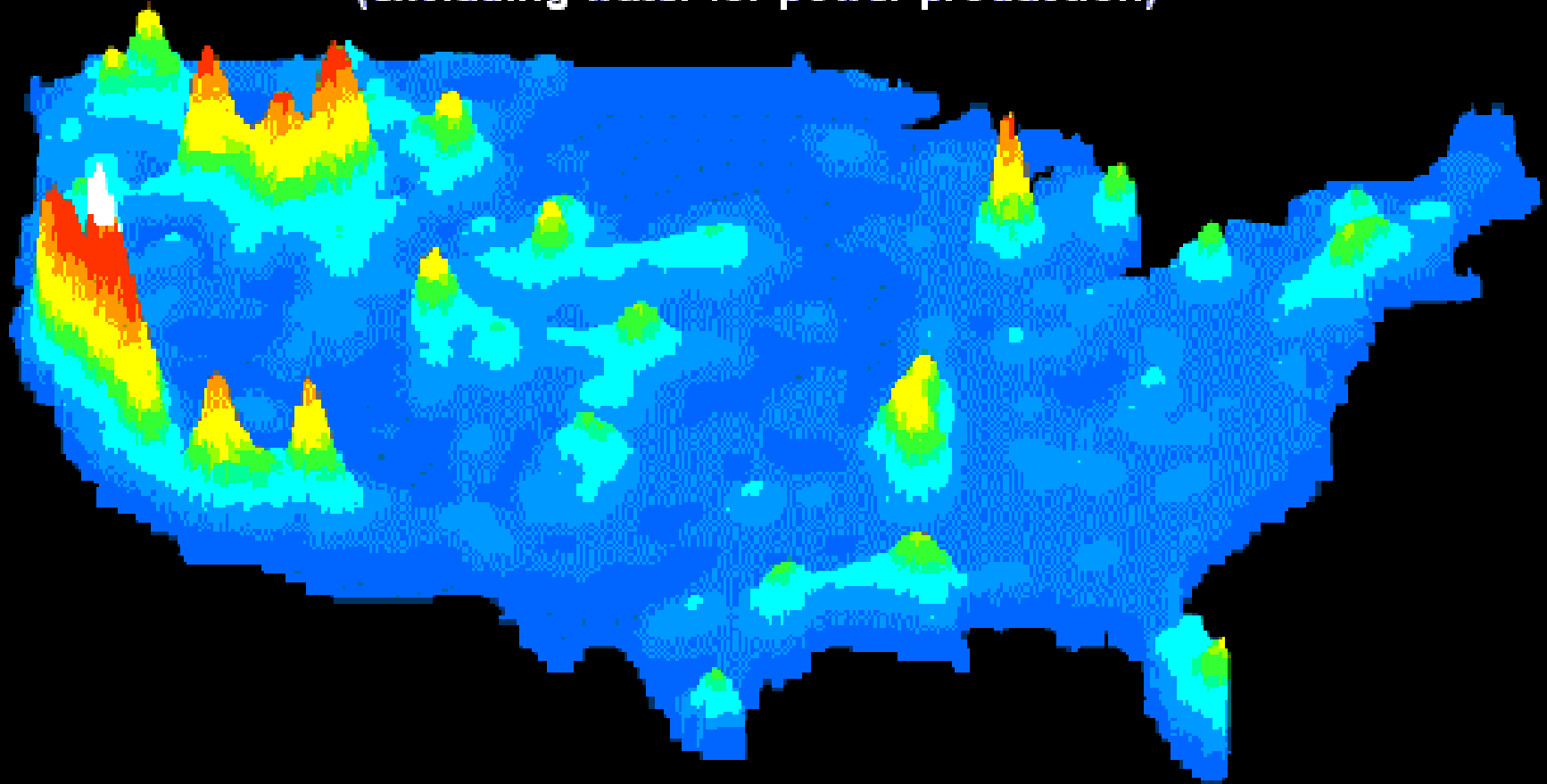


Geology of Carlsbad Caverns National Park





Total Water Withdrawals in the United States in 1990 (excluding water for power production)



Warm colors to white indicates the greatest amount of water withdrawal; cool, dark colors indicate the least.

Image from the EPA's "Water Atlas" web site

<http://www.epa.gov/ceisweb1/ceishome/atlas/nationalatlas/wateratlas.html>